

Amendments to the claims:

1 (previously presented). A method of storing charges generated by an optical signal in a solid state imaging device comprising the steps of:

(i) preparing the solid state imaging device comprising a unit pixel including

(a) a photo diode provided with

(1) a semiconductor layer of a first conductivity type, and

(2) an impurity region of a second conductivity type formed on

a surface layer of the semiconductor layer so that the photo diode has a buried structure, and

(b) a field effect transistor for optical signal detection formed in the semiconductor layer adjacently to the photo diode, provided with

(1) a source region of the second conductivity type formed on

the semiconductor layer,

(2) a drain region of the second conductivity type formed on

the semiconductor layer and connected to the impurity region,

(3) a channel region formed on the surface layer of the

semiconductor layer between a source region and a drain region,

(4) a gate electrode formed covering the entire channel region

by interpolating a gate insulating film, and

(5) a carrier pocket of a high-density buried layer of the first

conductivity type provided in the semiconductor layer under the channel region;

(ii) generating optically generated charges in the photo diode by light irradiation;

(iii) transferring the optically generated charges to the carrier pocket while accumulating movable charges of the same conductivity type as that of the source region over the entire channel region by means of a potential of the gate electrode; and

(iv) storing the optically generated charges in the carrier pocket while accumulating movable charges of the same conductivity type as that of the source region over the entire channel region by means of a potential of the gate electrode.

2 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 1, wherein the field effect transistor for optical signal detection is a depletion type.

3 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 1, wherein movable charges of the same conductivity type as that of the source region are accumulated over an entire surface layer of the semiconductor layer including the channel region at least in the steps of transferring and storing.

4 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 1, wherein a current is flowed to the field effect transistor for optical signal detection to read out a change in a threshold voltage after a period when the optically generated charges are transferred to the carrier pocket to be stored therein.

5 (currently amended). A method of storing charges generated by an optical signal in a solid state imaging device comprising the steps of:

(i) preparing the solid state imaging device comprising a unit pixel including

(a) a photo diode provided with

(1) a first semiconductor layer of a first conductivity type, and

(2) an impurity region of a second conductivity type formed on

a surface of the first semiconductor layer so that the photo diode has a buried structure, and

(b) a field effect transistor for optical signal detection placed adjacently to the photo diode, provided with

(1) a second semiconductor layer of the first conductivity type

connected to the first semiconductor layer,

(2) a source region of the second conductivity type formed on

the second semiconductor layer,

(3) a drain region of the second conductivity type formed on

the second semiconductor layer and connected to the impurity region,

(4) a channel region formed on a surface layer of the second

semiconductor layer between the source region and the drain region,

(5) a channel doped layer of the second conductivity type

formed on the channel region,

(6) a gate electrode formed covering the entire channel region by interpolating a gate insulating film, and

(7) a carrier pocket of the first conductivity type being provided in the second semiconductor layer under the channel region in the vicinity of a source region;

(ii) generating optically generated charges in the photo diode by light irradiation;
(iii) transferring the optically generated charges to the carrier pocket while accumulating movable charges of the second conductivity type over the entire channel region [[be]] by means of a potential of the gate electrode; and
(iv) storing the optically generated charges in the carrier pocket while accumulating movable charges of the second conductivity type over the entire channel region by means of a potential of the gate electrode.

6 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 5, wherein the field effect transistor for optical signal detection is a depletion type.

7 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 5, wherein movable charges of the second conductivity type are accumulated over an entire surface layer of the first and second semiconductor layers including the channel region at least in the steps of transferring and storing.

8 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 5, wherein a current is flowed to the field effect transistor for optical signal detection to read out change in a threshold voltage after a period when the optically generated charges are transferred to the carrier pocket to be stored therein.

9 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 5, further comprising a plurality of the pixels arranged in rows and columns, wherein the optical signals are stored in the respective pixels by supplying different scanning signals to the mutually connected gate electrodes of the field effect transistors arrayed in the same row, the mutually connected drain regions of the field effect transistors arrayed in the same row, and the mutually connected source regions of the field effect transistors arrayed in the same column.

10 (previously presented). The method of storing charges generated by an optical signal in a solid state imaging device according to claim 9, wherein the storing of the optical signals into the respective pixels and the reading-out of the stored optical signals are controlled by a vertical scanning signal driving scanning circuit for supplying a scanning signal to the gate electrodes in the raw, a drain voltage driving scanning circuit for supplying a drain voltage to the drain regions in the raw, a signal output circuit for storing voltages of the source regions in the column and further outputting an optical signal corresponding to the

Serial No. 09/774,667

voltage of the each source region, and a horizontal scanning signal input scanning circuit for supplying a scanning signal for controlling a timing of reading out the optical signal.